

Fog, temperature, and air quality over the Metropolitan Area of São Paulo: A trend analysis from 1998 through 2018

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Many meteorological stations worldwide show a decrease of the intensity and density of fog. It has been hypothesized that both climate change, i.e. an increase of the air temperature, as well as an increase of air quality, i.e. a decrease of gaseous air pollutants and the number concentration of hygroscopic aerosol particles, are drivers of the decrease of fog. We analyse very long time series from the Metropolitan Area of São Paulo (MASP) in order to test this hypothesis. Daily fog data since 1933, from Fonte do Ipiranga Weather Station, including all other meteorological data, indicates an overall decrease of fog days, although some very fog-intense years are documented for 1976 (193 days), 1977 (212 days), and 1978 (207 days). In 2018, only 59 foggy days are documented. Since 1998, PM10 (mass concentration of particulate material with aerodynamic diameters below 10 μm), SO_2 , and NO_x data are available from CETESB (São Paulo Air Pollution Agency). Unfortunately, a continuous time series of PM2.5 concentrations exists only since 2011. We focus our analysis to the 21-year period, 1998 – 2018, which presents continuous records of temperature, humidity, air pressure, PM10, SO_2 , and NO_x concentrations. A strong decrease of the number of foggy days has been documented for this recent period of investigation. Synchronously, air temperature increased and the PM10, SO_2 , and NO_x concentrations decreased. We apply a logistic regression analysis for the identification of trends and for analysing the regressions between the occurrence of fog on the one hand and temperature and air quality parameters on the other. Detailed results will be presented.